Release notes for ENDF/B Development n-040_Zr_095 evaluation

April 26, 2017

- `recent` Warnings:
  1. Fission widths given for non-fissile nucleus, but are zero
     0: Fission?

```
 Calculate Cross Sections from Resonance Parameters (RECENT 2015-1)
 ==========================================================================
 Retrieval Criteria----------        MAT
 File 2 Mimimum Cross Section- 1.0000E-10 (Standard Option)
 Reactions with No Background-     Output (Resonance Contribution)
... [590 more lines]
```

- `fudge-4.0` Warnings:
  1. Cross section does not match sum of linked reaction cross sections
     crossSectionSum label 0: total (Error # 0): CS Sum.

```
WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 7.51%
```

  2. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 1 (n + Zr95): / Form 'eval': / Component 0 (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

  3. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 1 (n + Zr95): / Form 'eval': / Component 1 (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

  4. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 2 ((z,n)): / Form 'eval': (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

  5. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 3 (n[multiplicity:'2'] + Zr94 + gamma): / Form 'eval': (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

  6. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 4 (Zr96 + gamma): / Form 'eval': / Component 0 (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

  7. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
     Section 4 (Zr96 + gamma): / Form 'eval': / Component 1 (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

- `fudge-4.0` Errors:

  1. Found a negative probability
     reaction label 20: n + (Zr95_c ->Zr95 + gamma) / Product: n / Distribution: / energyAngular - XYs3d: (Error # 0): Negative prob.

     ```
     WARNING: Negative probabilities encountered. Incident energy: 1.9e7 eV, worst case: -2.46312131941e-07
     ```

  2. Calculated and tabulated Q values disagree.
     reaction label 21: n[multiplicity:'2'] + Zr94 + gamma (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -6496975.821258545 eV vs -6.463e6 eV!
     ```

  3. Found a negative probability
     reaction label 21: n[multiplicity:'2'] + Zr94 + gamma / Product: n / Distribution: / energyAngular - XYs3d: (Error # 0): Negative prob.

     ```
     WARNING: Negative probabilities encountered. Incident energy: 1.9e7 eV, worst case: -5.08419139151e-09
     ```

  4. Calculated and tabulated Q values disagree.
     reaction label 22: n[multiplicity:'3'] + Zr93 + gamma (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -14718090.53442383 eV vs -1.4683e7 eV!
     ```

  5. Calculated and tabulated Q values disagree.
     reaction label 23: n + H1 + Y94 + gamma (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -10632517.46061707 eV vs -8.373e6 eV!
     ```

  6. Calculated and tabulated Q values disagree.
     reaction label 24: n + H2 + Y93 + gamma (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -14608980.31002808 eV vs -8.313e6 eV!
     ```

  7. Calculated and tabulated Q values disagree.
     reaction label 25: H1 + Y95 (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -3702630.480484009 eV vs -3.672e6 eV!
     ```

  8. Calculated and tabulated Q values disagree.
     reaction label 26: H1 + Y95_e1 (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -4388430.480484009 eV vs -4.3578e6 eV!
     ```

  9. Calculated and tabulated Q values disagree.
     reaction label 27: H1 + Y95_e2 (Error # 0): Q mismatch

     ```
     WARNING: Calculated and tabulated Q-values disagree: -4529530.480484009 eV vs -4.4989e6 eV!
     ```

  10. Calculated and tabulated Q values disagree.
      reaction label 28: H1 + Y95_e3 (Error # 0): Q mismatch

      ```
      WARNING: Calculated and tabulated Q-values disagree: -4790130.480484009 eV vs -4.7595e6 eV!
      ```

11. Calculated and tabulated Q values disagree.
reaction label 29: H1 + Y95_e4 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -5333530.480484009 eV vs -5.3029e6 eV!
```

12. Calculated and tabulated Q values disagree.
reaction label 30: H1 + Y95_e5 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -5592430.480484009 eV vs -5.5618e6 eV!
```

13. Calculated and tabulated Q values disagree.
reaction label 31: H1 + Y95_e6 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -5666030.480484009 eV vs -5.6354e6 eV!
```

14. Calculated and tabulated Q values disagree.
reaction label 32: H1 + Y95_e7 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -5723630.480484009 eV vs -5.693e6 eV!
```

15. Calculated and tabulated Q values disagree.
reaction label 33: H1 + Y95_e8 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -5749230.480484009 eV vs -5.7186e6 eV!
```

16. Calculated and tabulated Q values disagree.
reaction label 34: H1 + Y95_e9 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -5910230.480484009 eV vs -5.8796e6 eV!
```

17. Calculated and tabulated Q values disagree.
reaction label 35: H1 + Y95_e10 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6010630.480484009 eV vs -5.98e6 eV!
```

18. Calculated and tabulated Q values disagree.
reaction label 36: H1 + Y95_e11 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6111130.480484009 eV vs -6.0805e6 eV!
```

19. Calculated and tabulated Q values disagree.
reaction label 37: H1 + Y95_e12 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6260130.480484009 eV vs -6.2295e6 eV!
```

20. Calculated and tabulated Q values disagree.
reaction label 38: H1 + Y95_e13 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6317230.480484009 eV vs -6.2866e6 eV!
```

21. Calculated and tabulated Q values disagree.
reaction label 39: H1 + Y95_e14 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6386630.480484009 eV vs -6.356e6 eV!
```

22. Calculated and tabulated Q values disagree.
reaction label 40: H1 + Y95_e15 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6419830.480484009 eV vs -6.3892e6 eV!
```

23. Calculated and tabulated Q values disagree.
reaction label 41: H1 + (Y95_c -> Y95 + gamma) (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -6419830.480484009 eV vs -6.3892e6 eV!
```

24. Calculated and tabulated Q values disagree.
reaction label 42: He4 + Sr92 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 2822844.606536865 eV vs 2.863e6 eV!
```

25. Calculated and tabulated Q values disagree.
reaction label 43: He4 + Sr92_e1 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 2007864.606536865 eV vs 2048020. eV!
```

26. Calculated and tabulated Q values disagree.
reaction label 44: He4 + Sr92_e2 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 1438054.606536865 eV vs 1478210. eV!
```

27. Calculated and tabulated Q values disagree.
reaction label 45: He4 + Sr92_e3 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 1149544.606536865 eV vs 1.1897e6 eV!
```

28. Calculated and tabulated Q values disagree.
reaction label 46: He4 + Sr92_e4 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 1044514.606536865 eV vs 1084670. eV!
```

29. Calculated and tabulated Q values disagree.
reaction label 47: He4 + Sr92_e5 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 768944.6065368652 eV vs 8.091e5 eV!
```

30. Calculated and tabulated Q values disagree.
reaction label 48: He4 + Sr92_e6 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 734454.6065368652 eV vs 774610. eV!
```

31. Calculated and tabulated Q values disagree.
reaction label 49: He4 + Sr92_e7 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 682024.6065368652 eV vs 722180. eV!
```

32. Calculated and tabulated Q values disagree.
reaction label 50: He4 + Sr92_e8 (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 637844.6065368652 eV vs 6.78e5 eV!
```

33. Calculated and tabulated Q values disagree.
reaction label 51: He4 + (Sr92_c ->Sr92 + gamma) (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 637844.6065368652 eV vs 6.78e5 eV!
```

34. Calculated and tabulated Q values disagree.
reaction label 52: Zr96 + gamma (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 7821612.983795166 eV vs 7.854e6 eV!
```

35. Calculated and tabulated Q values disagree.
reaction label 53: n + He4 + Sr91 + gamma (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -4470896.057769775 eV vs -4.444e6 eV!
```

36. Calculated and tabulated Q values disagree.
reaction label 54: n[multiplicity:'2'] + He4 + Sr90 + gamma (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -10245887.84213257 eV vs -1.0212e7 eV!
```

37. Calculated and tabulated Q values disagree.
reaction label 55: n[multiplicity:'2'] + H1 + Y93 + gamma (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -16829173.31271362 eV vs -8.313e6 eV!
```

38. Calculated and tabulated Q values disagree.
reaction label 56: H1 + He4 + Rb91 + gamma (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -9588055.438781738 eV vs -9.553e6 eV!
```

39. Calculated and tabulated Q values disagree.
reaction label 57: H2 + (Y94_s ->Y94 + gamma) (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -8412324.457931519 eV vs -8.373e6 eV!
```

40. Calculated and tabulated Q values disagree.
reaction label 58: H3 + (Y93_s ->Y93 + gamma) (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -8351474.545211792 eV vs -8.313e6 eV!
```

- `njoy2012` Warnings:

1. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (0): HEATR/hinit (4)

```
 ---message from hinit---mf6, mt 16 does not give recoil za= 40094
                          one-particle recoil approx. used.
```

2. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (1): HEATR/hinit (4)

```
 ---message from hinit---mf6, mt 17 does not give recoil za= 40093
                          one-particle recoil approx. used.
```

3. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (2): HEATR/hinit (4)

```
---message from hinit---mf6, mt 22 does not give recoil za= 38091
                        one-particle recoil approx. used.
```

4. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (3): HEATR/hinit (4)

```
---message from hinit---mf6, mt 24 does not give recoil za= 38090
                        one-particle recoil approx. used.
```

5. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (4): HEATR/hinit (4)

```
---message from hinit---mf6, mt 28 does not give recoil za= 39094
                        one-particle recoil approx. used.
```

6. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (5): HEATR/hinit (4)

```
---message from hinit---mf6, mt 32 does not give recoil za= 39093
                        one-particle recoil approx. used.
```

7. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (6): HEATR/hinit (4)

```
---message from hinit---mf6, mt 41 does not give recoil za= 39093
                        one-particle recoil approx. used.
```

8. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (7): HEATR/hinit (4)

```
---message from hinit---mf6, mt 91 does not give recoil za= 40095
                        one-particle recoil approx. used.
```

9. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (8): HEATR/hinit (4)

```
---message from hinit---mf6, mt102 does not give recoil za= 40096
                        photon momentum recoil used.
```

10. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (9): HEATR/hinit (4)

```
---message from hinit---mf6, mt104 does not give recoil za= 39094
                        one-particle recoil approx. used.
```

11. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (10): HEATR/hinit (4)

```
---message from hinit---mf6, mt105 does not give recoil za= 39093
                        one-particle recoil approx. used.
```

12. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (11): HEATR/hinit (4)

```
---message from hinit---mf6, mt112 does not give recoil za= 37091
                        one-particle recoil approx. used.
```

13. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (12): HEATR/hinit (4)

```
---message from hinit---mf6, mt649 does not give recoil za= 39095
                        one-particle recoil approx. used.
```

14. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (13): HEATR/hinit (4)

```
---message from hinit---mf6, mt849 does not give recoil za= 38092
                        one-particle recoil approx. used.
```

- `njoy2012` Errors:

1. An angular distribution is negative
acer...monte carlo neutron and photon data (0): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                          2 for mt= 16 e= 1.080E+01
```

2. An angular distribution is negative
acer...monte carlo neutron and photon data (1): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                         10 for mt= 16 e= 1.114E+01
```

3. An angular distribution is negative
acer...monte carlo neutron and photon data (2): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                          3 for mt= 16 e= 1.148E+01
```

4. An angular distribution is negative
acer...monte carlo neutron and photon data (3): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                          2 for mt= 16 e= 1.182E+01
```

5. An angular distribution is negative
acer...monte carlo neutron and photon data (4): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                          2 for mt= 16 e= 1.215E+01
```

6. An angular distribution is negative
acer...monte carlo neutron and photon data (5): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                          2 for mt= 91 e= 1.080E+01
```

7. An angular distribution is negative
acer...monte carlo neutron and photon data (6): Neg. P(Ejμ) (b)

```
---message from ptleg2---negative probs found
                         10 for mt= 91 e= 1.114E+01
```

8. An angular distribution is negative
acer...monte carlo neutron and photon data (7): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                             3 for mt= 91 e= 1.148E+01
```

9. An angular distribution is negative
acer...monte carlo neutron and photon data (8): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                             2 for mt= 91 e= 1.182E+01
```

10. An angular distribution is negative
acer...monte carlo neutron and photon data (9): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                             2 for mt= 91 e= 1.215E+01
```

11. An angular distribution is negative
acer...monte carlo neutron and photon data (10): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                            18 for mt= 91 e= 1.249E+01
```

12. An angular distribution is negative
acer...monte carlo neutron and photon data (11): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                            20 for mt= 91 e= 1.283E+01
```

13. An angular distribution is negative
acer...monte carlo neutron and photon data (12): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                             1 for mt= 91 e= 1.317E+01
```

14. An angular distribution is negative
acer...monte carlo neutron and photon data (13): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                             1 for mt= 91 e= 1.351E+01
```

15. An angular distribution is negative
acer...monte carlo neutron and photon data (14): Neg. P(Ejμ) (b)

```
 ---message from ptleg2---negative probs found
                            24 for mt= 91 e= 1.384E+01
```

- `xsectplotter` Errors:

1. Exception IndexError was thrown
/usr/local/lib/python2.7/site-packages/matplotlib-1.5.3-py2.7-linux-x86_64.egg/matplotlib/font_manager.py:2
UserWarning: Matplotlib is building the font cache using fc-list. This may take a moment. (Error # 2): IndexError

```
IndexError: index out of range
```